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(54) **A system for use in Jacquard machines.**

(57) A system for use in jacquard machines and the like, including a large number of yarn guiding means, sinkers, healds, needles or the like actuable by selection means and operating means and are movable between predetermined positions.

The novelty resides in the feature that the yarn guiding means, the sinkers, the healds, the needles or the like (2) are adapted when reaching predetermined positions to come into engagement with spring means (8, 9) to be stretched so that a section of the yarn guiding means or the like situated between the spring means and an engaging operating means is kept stretched.

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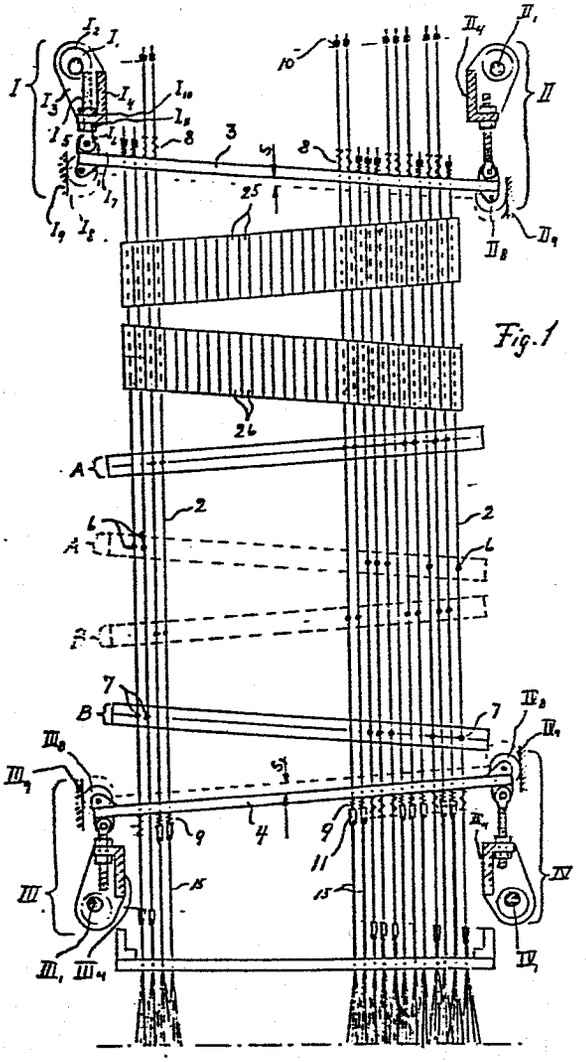

Fig. 1

A SYSTEM FOR USE IN JACQUARD MACHINES

The present invention relates to a system for use in jacquard machines and the like, including a large number of yarn guide members, sinkers, healds, needles or the like actuable by means of selecting members and operating means and movable between predetermined positions.

It is known from my Swedish Patent No. 396098 and my published Swedish Patent Applications Nos. 78078771 and 7808898-6 that a forced starting, braking, retardation and a safe hooking of sinkers in their diametrically opposite turning position can be achieved int. alia by using so-called acceleration and retardation springs on each sinker.

As a jacquard machine must be designed for the individual working speeds of different weaving machines or looms it is desirable that the spring power in the above-mentioned springs is adjustable for different maximum constant working speeds.

It is also desirable that the spring power in the acceleration and retardation springs for acceleration and braking, catching of the sinkers in the bottom shed and top shed positions, respectively, within certain limits can be set in response to the downwardly directed pull acting upon the sinkers via the harness threads. This pull can vary from one weaving machine to another depending on the sum of downwardly directed pull forces in as much as different numbers of harness threads with their heddles or healds and counter pull springs. Rubber springs can be connected to each sinker.

The object of the invention is to provide a system overcoming said inconveniences and ensuring a smooth safe running for the machine.

The essential characteristic of the system of the invention is that the yarn guiding means, the sinkers,

the healds, the needles or the like are adapted when reaching predetermined positions to come into engagement with resilient means so as to be subjected to pull or stretching action whereby a section of the yarn guiding means or the like situated between said resilient means and a section of the yarn guiding means engaging the operating means will be kept stretched.

The invention will be described in more detail below with reference to the accompanying drawings, in which:

Fig. 1 is a schematical side view showing in principle a jacquard machine with the system of the invention;

Fig. 2 shows partly in section and on a larger scale a coupling unit connecting a sinker and a harness thread or the like;

Fig. 3 shows, likewise on a larger scale, a broken-out portion of the upper spring tension member of Fig. 1 in cross-section on line A-A in Fig. 4;

Fig. 4 shows the same in longitudinal section;

Fig. 5 shows a broken-out portion of Fig. 4; and

Fig. 6 is a top view showing, on a still larger scale, details from Figs. 3 and 4.

The drawing Fig. 1 is an overall side view showing schematically and in principle, on a largly reduced scale, a jacquard machine which in accordance with the invention is provided with manually adjustable acceleration/retardation spring tension means 3, 4, I, II, III, and IV for collective setting of acceleration and retardation springs 8, 9 which are placed in such a way relative to the sinkers 2 and the sinker guiding or selecting means 25, 26 respectively - according to my Swedish Patent Application No. 7808898-6 and the sinker operating means A and B according to my Swedish Patent No. 396 098 and Patent Application No. 7808771 - as to obtain satisfactory cooperation between these different elements and an adequate power transmission within the sinkers at full normal working speed and for the weaving machine/jacquard

machine or for the fabric quality that can be produced in the weaving machine.

In Fig. 1, four spring tension means are designated by I, II, III and IV and out of these two and two, viz. respectively I, II and III, IV - are setting means for the spring tension means 3 and 4. For greater simplicity only the means I is described in more detail here because the function of the spring tension and setting means I, II, III and IV is identical. The construction of the means I, II, III and IV is identical and for greater clarity the latter three have not been provided with any reference numerals in Fig. 1.

The spring tension means 3 and 4 which in their simplest embodiment may consist of two relatively movable perforated plates reinforced by bars being vertically oriented thereto or - as will be described below - may be designed according to Figs. 3, 4, 5 and 6, are suspended in beams I_4, II_4, and IV_4 via screw connections and link systems I_5, I_6, I_7 mounted each on one side of a so-called sinker package. Each of the setting means I, II, III and VII is in turn suspended in an eccenter mechanism I_2 I_3 and mounted each on one shaft I_1, in pairs on either side of the sinker system. The spring tension means 3 and 4 carry, on their two opposite sides, rolls I_8, II_8, II_8, IV_8 running vertically along supporting bars I_9, II_9, III_9, IV_9 whereby the means 3 and 4 are given checked vertical movements. The parallel beams I_4, II_4, III_4 and IV_4 are fixed by means of screw connections I_5 and nuts I_{10}, I_{11}. By loosening these and turning them in one or the other direction the screw connections and the spring tension means 3 and 4 connected therewith can be manually vertically moved to different heights. In this way the tension in all the acceleration and retardation springs 8 and 9 in the turning positions of the sinkers in top and bottom shed can be collectively adjusted or prestressed to a normal value being oppropriate to sinker acceleration or retardation.

A further simple manner of collectively changing the spring tension is obtained as the spring tension means I, II, III and IV are eccentrically borne on the shafts I_1, II_1, III_1 and IV_1, the adjustment of the springs being obtained by different turning of the latter. Such a temporarily varying lower spring tension would be obtained e.g. by electrical step motors (not shown) driving said shafts in one direction or the other to various positions between the manually set maximum tension value - i.e. the value adjusted to the working speed normal to the weaving machine/jacquard machine - and an opposite minimum value. The shafts can in this connection move at most a half revolution between positions for minimum tension in the springs designated 8 and 9, corresponding to the distances S and S_1. The step motors can obtain their control impulses from e.g. electrically active dynamic potentiometers, dynamometers or the like inertia sensing means attached e.g. to the sinker operating means A and B.

The acceleration and retardation springs 8 and 9 accelerate and brake the sinkers in their opposite end positions because the springs and the spring tension means 3 and 4 are placed at the uppermost and lowermost positions of the sinker ends. Pull forces will always be exerted in the sinkers between their abutment beads or projections designated 6 and 7 which are captured by the sinker operating means A and B and the springs 8 and 9 which are kept in abutment with the spring tension means 3 and 4. This prevents bulging and consequently unnecessary vibration of the sinkers.

The springs 8 and 9 are compressed between the spring tension means 3 and 4, respectively, and at abutment means 10 and 11 respectively attached to both ends of each sinker by means of a snap lock device 10, 11, 12, 13, 14 shown in Fig. 2.

The snap lock device includes an abutment sleeve body 12 and a U-shaped means 12 at a longer shank pro-

vided with a hook-shaped end portion 12_1. At the one end portion of the abutment sleeve body 11 is an eccentrically situated axial bore 11_1 and a shorter shank 12_2 is inserted therein to keep said U-shaped means in position. The longer shank provided with the hook-shaped end portion 12_1 extends along an axial slit towards and into a centrical bottom bore 11_2 at the opposite sleeve body end. Arranged inwardly of the slit in the portion of the sleeve body 11 situated beyond the bottom of the last-mentioned bore 11_2 is a tangential recess 14.

The bent-over end of the sinker 2 is intended to be inserted into the bore 11_3 where it is snap locked by the hook-shaped end 12_1 being snapped over it. The U-bent end portion 12_3 of the means 12 is adapted to serve as an attachment eye for a harness strap or for harness threads 15.

By inserting a suitable tool, e.g. a screw driver, in the tangential recess 14 of the sleeve body 11 it is possible to displace the longer leg outwardly, whereby the engagement with the sinker end is broken and this end can be pulled out for exchange, if so desired.

Figs. 3 and 4 show, on an approximately natural scale, parts of an embodiment of the schematically illustrated spring tension means 3 and 4 in Fig. 1. Figs. 3 and 4 show only the uppermost spring tension means 3 but since the two spring tension means 3 and 4 can be of identical design numeral 4 corresponding to the bore or plate 4 in Fig. 1 has been put within parentheses. Thus the spring tension means 3 and 4 in Fig. 1 symbolize the supporting bars 3a (4a), 3b (4b), 3c (4c) and 3d (4d) on which the spring tension means proper, designated 18, are borne. The spring tension means 18 include vertically positioned angle or L-bars of such a height that sufficient bending strength will be obtained. The angle bars are at their ends formed with lower portions 19 which rest in openings formed between the vertically and angularily adjustable support bars 3a (4a),

3b (4b), 3c (4c) and 3d (4d). The angle bars 18 rest substantially on the support bars 3a (4a) and 3d (4d) which, in turn, are suspended in the spring tension means I, II, III and IV as shown in Fig. 1. The lower outer ends of the angle or L-bars extend through parallel vertical slits 20 in bars 22, 23 fixedly mounted on the outside of the support bars in the machine and in this way they can maintain their equal interspaces and verticality independently of vertical displacement.

Another angle or L-shaped locking bar 17 bears against one portion, the narrower one, at the top of the angle bar 18. The lock bar is at even intervals perforated with oblong holes 16 which are shown in Figs. 3 and 5. These oblong holes correspond with similar holes in the spring tension bar 18. By displacement of the lock bar 17 round holes are formed in which the sinkers 2 move up and down. If sinkers 2 are to be shifted the lock bar is displaced so that the oblong holes completely correspond which each other, whereby the sinkers 2 with its abutment beads or studs 6, 7 and guide hooks freely can be pulled therethrough. This is shown in a section through the angle bars 17 and 18 adjacent the sinker 2 seen to the left in Fig. 3. Figs. 3 and 4 show three sinkers localized in their lowermost turning positions in which the springs 8 are compressed.

Fig. 6 is a top view showing the support bars 4b and 4c and the sinkers 2, which are indicated by black dots, acceleration and retardation springs 8 and oblong holes 16 in lock bars 17 on the top of spring tension bars 18. Further the fixed bars 22, 23 with the parallel slits 21 indicated by broken lines can be seen. The figure also shows a cross-section through air impulse channels 27, of which only two are partly shown in Fig. 4. These channels extend across the uppermost spring tension means 3 in Fig. 1 with its spring tension bars 18 according to Fig. 4, said channel 27 being vertically mounted in rows in the openings between each spring

tension bar 18 and lock bar 17. For greater clarity said pipes are not shown in Fig. 1 but so is the positioning of the guide bars 25 and 26.

It is clearly apparent from Fig. 1 and Fig. 4 how the spring tension means 3 and 4 and the respective bars 18, guide bars 25, 26 as well as the sinker operating mechanisms A and B are inclined and are positioned at different levels and are localized in inclined turning positions. The latter applies to the operating mechanisms A and B in order to effect a so-called clean shed in the weaving machine.

CLAIMS

1. A system for use in jacquard machines and the like, including a large number of yarn guiding means, sinkers, healds, needles or the like actuable by means of selecting members and operating members and movable between predetermined positions, c h a r a c t e r i z e d in that the yarn guiding means, the sinkers, the healds, the needles or the like (2) are adapted when reaching predetermined positions to come into engagement with resilient means (8, 9) so as to be subjected to pull or stretching action so that a portion of the yarn guiding means or a corresponding similar portion situated between said resilient spring means and an engaging operating means, is kept stretched.

2. A system as claimed in claim 1, c h a r a c t e r i z e d in that the yarn guiding means, the sinkers, the healds, the needles or the like (2) are provided with non-displaceably fixed projections (10, 11) adapted on arriving at a predetermined displacement position to come into engagement with the resilient means (8, 9) which in turn engage abutment means (3, 4) which are adjustable as regards their position.

3. A system as claimed in claim 1, c h a r a c t e r i z e d in that the abutments for the resilient means or spring members (8, 9) consist of plates, grids or the like (3, 4) provided with passages for the yarn guiding means or the like, said plates being adjustable by means of screw means or the like (I_5, I_{10}, I_{11}) and/or adjustable by means of eccenter means or the like (I_1, I_2, I_3).

4. A system as claimed in claim 4, c h a r a c t e r i z e d in that the spring means (8) are adapted, on the movement of the yarn guiding means (2) effected by one of the operating means (A, B) in a lower turning position, to be situated between projec-

tions or the like (10_1) situated on the yarn guiding means and a spring tension plate or the like (3_1) common to several yarn guiding means in the axial direction thereof or vertically adjustable, said spring means (8_1) being adapted to exert a spring action upon the yarn guiding means (2) between the projections (10_1) attached on or pressed against the same and the spring tension plate or the like (3_1), said function being obtained in a position between the lowermost (26) of two yarn guide selecting means (25, 26) and the uppermost (A) of the two operating means (A, B) in the uppermost turning position thereof.

5. A system for use in a jacquard machine as claimed in claim 3, c h a r a c t e r i z e d in that the spring tension means (3, 3_1, 4) are manually adjustable in the longitudinal direction (vertically) of the yarn guiding means through the screw means (I_4, I_{10}, I_{11}).

6. A system for use in jacquard machines as claimed in claim 5, c h a r a c t e r i z e d in that the spring tension means (3, 3_1, 4) manually adjustable in the longitudinal direction of the yarn guide means (2) are suspended in the eccenter means and are adapted, by means of e.g. electric step motors via shafts (I_1, II_1, III_1, IV_1) automatically to effect parallel displacements of the spring tension means (3, 3_1, 4) to obtain varying spring tension in the spring beams (8, 9) at varying speed in the weaving machine/jacquard machine.

7. A system as claimed in claims 1 and 2, c h a r a c t e r i z e d in that a yarn guiding means, a sinker, a heald, a needle or the like (2) is equipped with abutment means engaging the spring means (8, 9) and that such abutment means includes a hollow part (11) receiving the headed end of the yarn guiding means or the like, and a springed hook like part (12) projecting into the hollow part to releasably hold the yarn guiding means or the like therein and that the

springed part preferably is integral with a U-shaped portion (12_3) forming an attachment eye for a harness or the like.

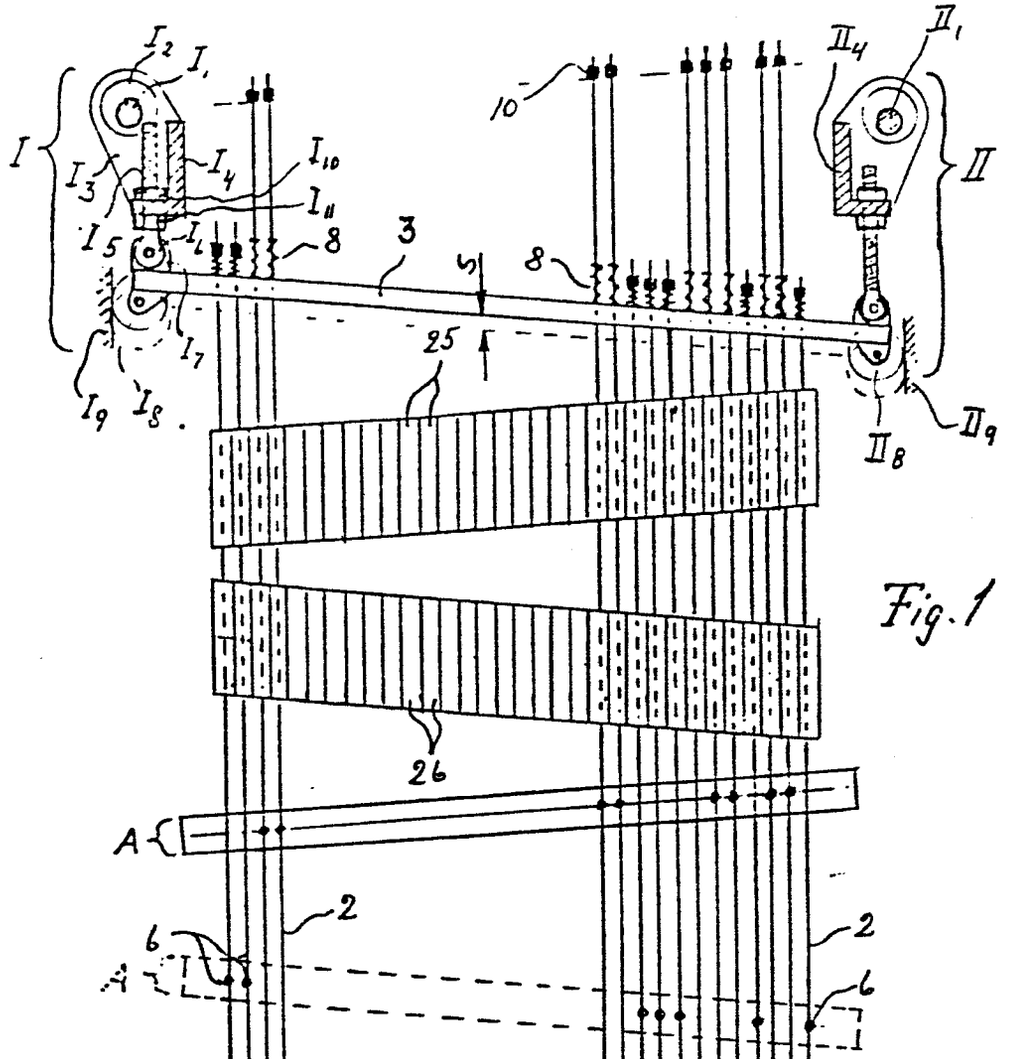
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Fig. 1

Fig. 2

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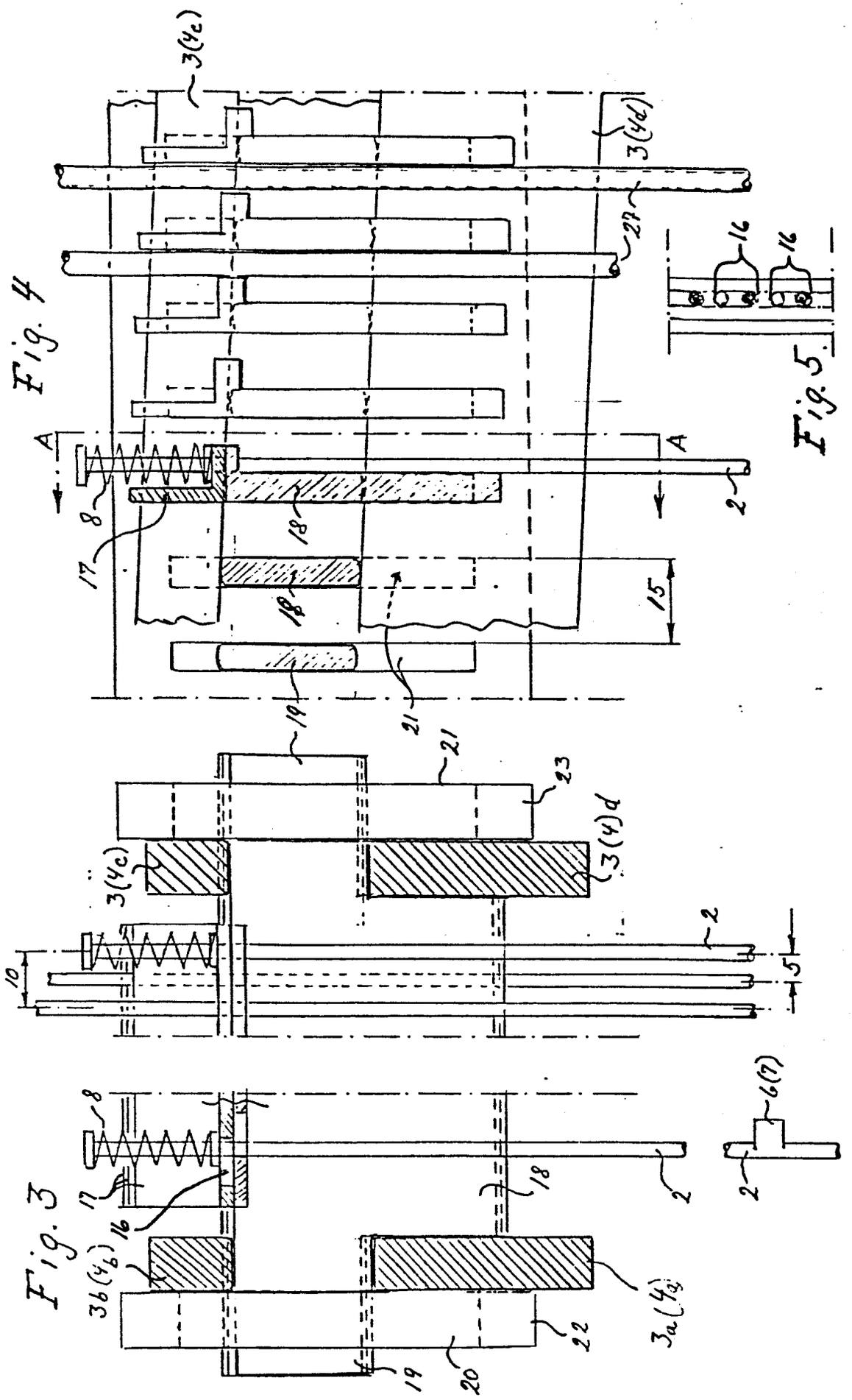

Fig. 4

Fig. 5

Fig. 3

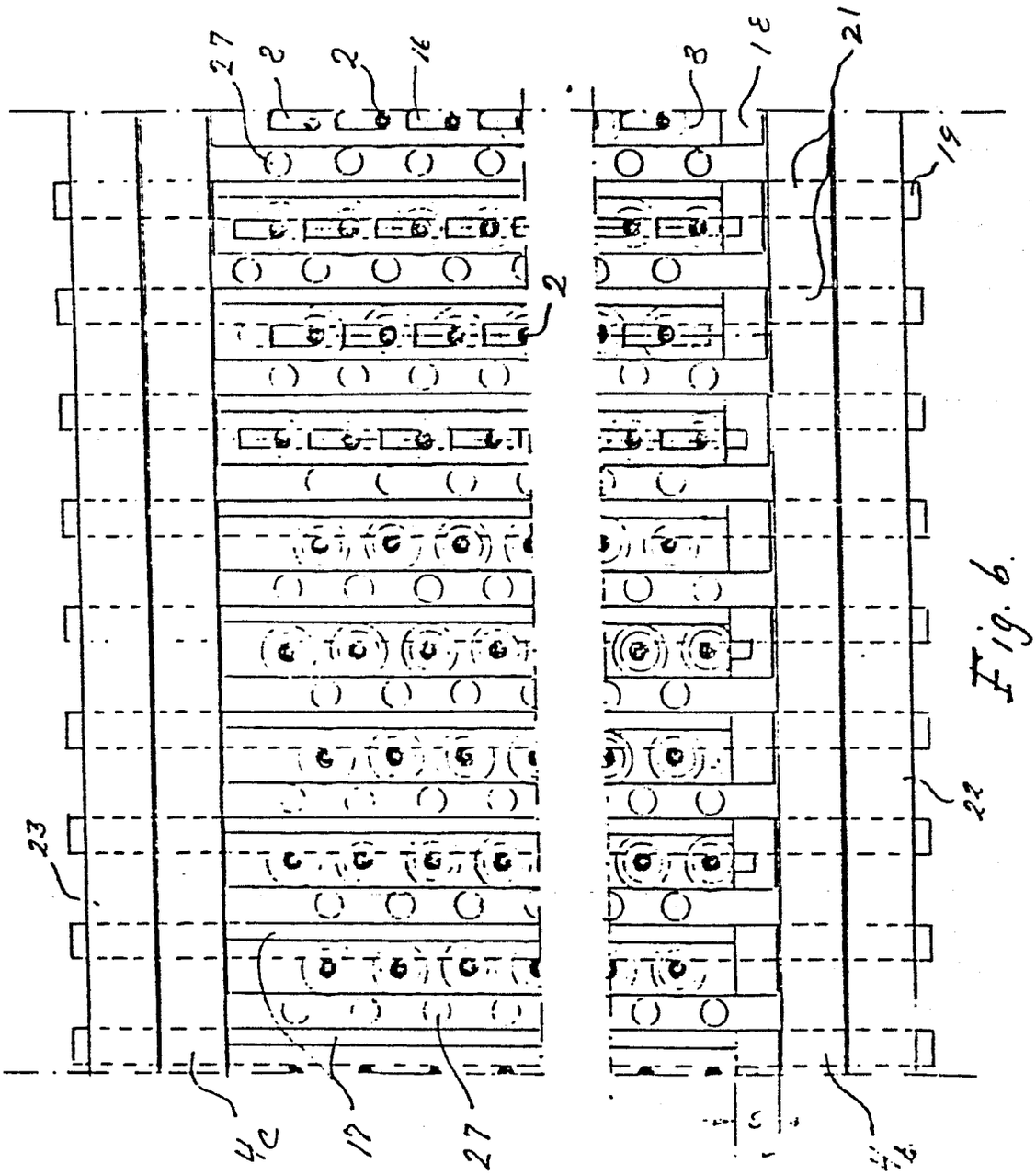

Fig. 6.